

**What is claimed is:**

1. An electric power generation system comprising

- 5 (a) a fuel cell stack connectable to an external electrical circuit for supplying electric current to said external circuit, said stack comprising at least one solid polymer fuel cell and fluid stream passages for directing fluid streams through said at least one fuel cell; and
- 10 (b) a purge system comprising a purge conduit having an inlet end connectable to a purge fluid supply and an outlet end connected to at least one of said fluid stream passages, and a purge flow control device for controlling the flow of a pressurized purge fluid through said purge conduit such that water is capable of being purged from at least
- 15 one of said fluid stream passages after a supply of electric current from said stack to said external circuit has been interrupted.
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2. The electric power generation system of claim 1 wherein said fluid stream passages are reactant stream passages.

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3. The electric power generation system of claim 2 wherein said reactant stream passages comprise oxidant stream passages.

4. The electric power generation system of claim 2 wherein said reactant stream passages comprise fuel stream passages.

5. The electric power generation system of claim 1 wherein said fluid stream passages comprise a coolant passage.

6. The electric power generation system of claim 1 wherein said purge flow control device comprises a control valve connected to said purge conduit.

7. The electric power generation system of claim 6 wherein said purge flow control device further comprises a control unit communicative with said control valve and with an input signal source.

8. The electric power generation system of claim 7 wherein said control unit is a micro-controller.

9. The electric power generation system of claim 1 wherein said purge system further comprises a pressure regulator associated with said purge conduit for regulating the pressure of

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5    said purge fluid from said purge fluid supply to  
     said at least one reactant passage.

     10.    The electric power generation system of  
claim 1 wherein said purge fluid is inert.

     11.    The electric power generation system of  
claim 11 wherein said purge fluid is nitrogen.

     12.    An electric power generation system  
comprising:

- 5            (a)    a fuel cell stack connectable to an  
             external electrical circuit for  
             supplying electric current to said  
             external circuit, said stack comprising  
             at least one solid polymer fuel cell,  
             and reactant stream passages for  
             directing reactant streams through said  
10            at least one fuel cell; and  
             (b)    a humidifier in fluid communication with  
             at least one of said reactant stream  
             passages, for humidifying a reactant  
             stream supplied to said fuel cell stack;  
15            and  
             (c)    a humidifier bypass system comprising at  
             least one bypass conduit for directing  
             said reactant stream to said stack in  
             fluid isolation from said humidifier and  
20            a bypass control device for selectively  
             directing flow of said reactant stream  
             to said fuel cell stack through either

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18. The electric power generation system of claim 18 wherein said control unit is a micro-controller.

19. The electric power generation system of claim 12 wherein one of said reactant passages is an oxidant flow passage.

20. The electric power generation system of claim 12 wherein one of said reactant passages is a fuel flow passage.

21. An electric power generation system comprising

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10 fluid streams through said at least one  
fuel cell; and

(b) a mechanism for directing the flow of a  
pressurized purge fluid from a purge  
fluid supply to at least one of said  
fluid stream passages such that water  
15 can be purged from said at least one  
purged fluid stream passage after a  
supply of electric current from said  
stack to said external circuit has been  
interrupted.

22. An electric power generation system  
comprising

(a) a fuel cell stack connectable to an  
external electrical circuit for  
5 supplying electric current to said  
external circuit, said stack comprising  
at least one solid polymer fuel cell,  
and reactant stream passages for  
directing reactant streams through said  
10 at least one fuel cell;

(b) apparatus for humidifying at least one  
of said reactant streams supplied to  
said fuel cell stack; and

(c) a humidifier bypass system comprising  
15 apparatus for directing at least one of  
said reactant streams to said stack in  
fluid isolation from said humidifying  
apparatus, and apparatus for selectively  
directing flow of said reactant streams

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to said fuel cell stack through said  
humidifying apparatus or in fluid  
isolation from said humidifying  
apparatus.

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